Geophysical Research Abstracts
Vol. 19, EGU2017-13095-1, 2017
EGU General Assembly 2017

The importance of the Gurian stage: magnetostratigraphic correlation of the Calabrian in the southern Caucasus and its paleoclimatic implications

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The precise chronostratigraphy of the Neogene-Quaternary period throughout Eurasia is still limited by several regional stages of local use. Such stages often have no independent and absolute age determinations. This makes accurate paleoclimatic reconstructions of areas like the Caucasus to be difficult. This is particularly important since the area is of crucial significance when trying to integrate climate variability and faunal interchange between Africa and Eurasia in the late Neogene-Quaternary. Quaternary sections from western Georgia have produced an important amount of paleoclimatic information. Unfortunately, these records do not have a clear chronology. This is the case of the Gurian stage which has been roughly correlated with the lower Pleistocene on the basis of poorly documented bio- and magnetostratigraphic data.

In order to better date the Gurian stage and its boundary stages, a magnetostratigraphic study has been carried out in several sections. All main sections with with Gurian sediments in the former Rioni bay (a marine restricted area to the southeast of the Major Caucasus) have been the goal of magnetostratigraphic investigations. Our data confirm for the first time the strict equivalence between the Gurian and the Calabrian stages.

Furthermore, the obtained results provides further information on the tectonic evolution of the Rioni bay during the Calabrian times in the area: (1) in the north, Gurian layers were unconformably deposited on older Meotian sediments in a piggy back basin, (2) in the south, Gurian strata are conformably overlying Kujalnician (Plio-Pleistocene) succession, (3) magnetostratigraphy of several correlated sections indicate important changes in sediment accumulation within the same basin, (4) rock magnetic data provide remarkable magnetomineralogical differences between Gurian and the older Miocene strata likely reporting a transition related to changes in oxic conditions, supply of terrigenous sediment and accumulation rate close to the Miocene-Pliocene boundary. These results provide a strong frame for further structural and paleoclimatic research in this area and already indicates that, even though the glacial-interglacial cycles are equally expressed in pollen records of Armenia and Georgia, a huge variability of vegetation throughout the Caucasus region is present at the Early-Middle Pleistocene transition.